§ 575.104 Uniform tire quality grading standards.

(a) *Scope*. This section requires motor vehicle and tire manufacturers and tire brand name owners to provide information indicating the relative performance of passenger car tires in the areas of treadwear, traction, and temperature resistance.

(b) *Purpose*. The purpose of this section is to aid the consumer in making an informed choice in the purchase of passenger car tires.

(c) *Application*. (1) This section applies to new pneumatic tires for use on passenger cars. However, this section does not apply to deep tread, winter-type snow tires, space-saver or temporary use spare tires, tires with nominal rim diameters of 12 inches or less, or to limited production tires as defined in paragraph (c)(2) of this section.

(2) ''Limited production tire'' means a tire meeting all of the following criteria, as applicable:

(i) The annual domestic production or importation into the United States by the tire's manufacturer of tires of the same design and size as the tire does not exceed 15,000 tires;

(ii) In the case of a tire marketed under a brand name, the annual domestic purchase or importation into the United States by a brand name owner of tires of the same design and size as the tire does not exceed 15,000 tires;

(iii) The tire's size was not listed as a vehicle manufacturer's recommended tire size designation for a new motor vehicle produced in or imported into the United States in quantities greater than 10,000 during the calendar year preceding the year of the tire's manufacture; and

(iv) The total annual domestic production or importation into the United States by the tire's manufacturer, and in the case of a tire marketed under a brand name, the total annual domestic purchase or purchase for importation into the United States by the tire's brand name owner, of tires meeting the criteria of paragraphs (c)(2) (i), (ii), and (iii) of this section, does not exceed 35,000 tires.

Tire design is the combination of general structural characteristics, materials, and tread pattern, but does include cosmetic, identifying or other minor variations among tires.

(d) *Requirements*—(1) *Information*. (i) Each manufacturer of tires, or in the case of tires marketed under a brand name, each brand name owner, shall provide grading information for each tire of which he is the manufacturer or brand name owner in the manner set forth in paragraphs (d)(1)(i) (A) and (B) of this section. The grades for each tire shall be only those specified in paragraph (d)(2) of this section. Each tire shall be able to achieve the level of performance represented by each grade with which it is labeled. An individual tire need not, however, meet further requirements after having been subjected to the test for any one grade.

(A) Except for a tire of a new tire line, manufactured within the first six months of production of the tire line, each tire shall be graded with the words, letters, symbols, and figures specified in paragraph (d)(2) of this section, permanently molded into or onto the tire sidewall between the tire's maximum section width and shoulder in accordance with one of the methods described in Figure 1. For purposes of this paragraph, new tire line shall mean a group of tires differing substantially in construction, materials, or design from those previously sold by the manufacturer or brand name owner of the tires. As used in this paragraph, the term ''construction'' refers to the internal structure of the tire (e.g., cord angles, number and placement of breakers), ''materials'' refers to the substances used in manufacture of the tire (e.g., belt fiber, rubber compound), and ''design'' refers to properties or conditions imposed by the tire mold (e.g., aspect ratio, tread pattern).

(B) Each tire manufactured on and after the effective date of these amendments, other than a tire sold as original equipment on a new vehicle, shall have affixed to its tread surface so as not to be easily removable a label or labels containing its grades and other information in the form illustrated in Figure 2, Parts I and II. The treadwear grade attributed to the tire shall be either imprinted or indelibly stamped on the label containing the material in Part I of Figure 2, directly to the right of or below the word ''TREADWEAR.''

The traction grade attributed to the tire shall be indelibly circled in an array of the potential grade letters AA, A, B, or C, directly to the right of or below the word ''TRACTION'' in Part I of Figure 2. The temperature resistance grade attributed to the tire shall be indelibly circled in an array of the potential grade letters A, B, or C, directly to the right of or below the word ''TEMPERATURE'' in Part I of Figure 2. The words ''TREADWEAR,'' ''TRACTION,'' AND ''TEMPERATURE,'' in that order, may be laid out vertically or horizontally. The text of Part II of Figure 2 may be printed in capital letters. The text of Part I and the text of Part II of Figure 2 need not appear on the same label, but the edges of the two texts must be positioned on the tire tread so as to be separated by a distance of no more than one inch. If the text of Part I and the text of Part II of Figure 2 are placed on separate labels, the notation ''See EXPLANATION OF DOT QUALITY GRADES'' shall be added to the bottom of the Part I text, and the words ''EXPLANATION OF DOT QUALITY GRADES'' shall appear at the top of the Part II text. The text of Figure 2 shall be oriented on the tire tread surface with lines of type running perpendicular to the tread circumference. If a label bearing a tire size designation is attached to the tire tread surface and the tire size designation is oriented with lines type running perpendicular to the tread circumference, the text of Figure 2 shall read in the same direction as the tire size designation.

(ii) In the case of the information required by §575.6(c) to be furnished to prospective purchasers of tires, each tire manufacturer or brand name owner shall, as part of that information, list all possible grades for traction and temperature resistance, and restate verbatim the explanation for each performance area specified in Figure 2. The information need not be in the same format as in Figure 2. The information must indicate clearly and unambiguously the grade in each performance area for each tire of that manufacturer or brand name owner offered for sale at the particular location.

(iii) Each manufacturer of motor vehicles equipped with passenger car tires shall include in the owner's manual of each such vehicle a list of all possible grades for traction and temperature resistance and restate verbatim the explanation for each performance area specified in Figure 2, Part II. The information need not be in the exact format of Figure 2, Part II, but it must contain a statement referring the reader to the tire sidewall for the specific tire grades for the tires with which the vehicle is equipped, as follows:

UNIFORM TIRE QUALITY GRADING

Quality grades can be found where applicable on the tire sidewall between tread shoulder and maximum section width. For example:

TREADWEAR 200 TRACTION AA
TEMPERATURE A

(iv) In the case of information required in accordance with §575.6(a) to be furnished to the first purchaser of a new motor vehicle, each manufacturer of motor vehicles shall, as part of the required information, list all possible grades for traction and temperature resistance and restate verbatim the explanation for each performance area specified in Figure 2 to this section. The information need not be in the format of Figure 2 to this section, but it must contain a statement referring the reader to the tire sidewall for the specific tire grades for the tires with which the vehicle is equipped.

(2) *Performance*—(i) *Treadwear.* Each tire shall be graded for treadwear performance with the word ''TREADWEAR'' followed by a number of two or three digits representing the tire's grade for treadwear, expressed as a percentage of the NHTSA nominal treadwear value, when tested in accordance with the conditions and procedures specified in paragraph (e) of this section. Treadwear grades shall be expressed in multiples of 20 (for example, 80, 120, 160).

(ii) *Traction.* Each tire shall be graded for traction performance with the word ''TRACTION,'' followed by the symbols AA, A, B, or C, when the tire is tested in accordance with the conditions and

procedures specified in paragraph (f) of this section.

(A) The tire shall be graded C when the adjusted traction coefficient is either:

(*1*) 0.38 or less when tested in accordance with paragraph (f)(2) of this section on the asphalt surface specified in paragraph (f)(1)(i) of this section, or

(*2*) 0.26 or less when tested in accordance with paragraph (f)(2) of this section on the concrete surface specified in paragraph (f)(1)(i) of this section.

(B) The tire may be graded B only when its adjusted traction coefficient is both:

(*1*) More than 0.38 when tested in accordance with paragraph (f)(2) of this section on the asphalt surface specified in paragraph (f)(1)(i) of this section, and

(*2*) More than 0.26 when tested in accordance with paragraph (f)(2) of this section on the concrete surface specified in paragraph (f)(1)(i) of this section.

(C) The tire may be graded A only when its adjusted traction coefficient is both:

(*1*) More than 0.47 when tested in accordance with paragraph (f)(2) of this section on the asphalt surface specified in paragraph (f)(1)(i) of this section, and

(*2*) More than 0.35 when tested in accordance with paragraph (f)(2) of this section on the concrete surface specified in paragraph (f)(1)(i) of this section.

(D) The tire may be graded AA only when its adjusted traction coefficient is both:

(*1*) More than 0.54μ when tested in accordance with paragraph (f)(2) of this section on the asphalt surface specified in paragraph (f)(1)(i) of this section; and

(*2*) More than 0.38μ when tested in accordance with paragraph (f)(2) of this section on the concrete surface specified in paragraph (f)(1)(i) of this section.

(iii) *Temperature resistance.* Each tire shall be graded for temperature resistance performance with the word ''TEMPERATURE'' followed by the letter A, B, or C, based on its performance when the tire is tested in accordance with the procedures specified in paragraph (g) of this section. A tire shall be considered to have successfully completed a test stage in accordance with this paragraph if, at the end of the test stage, it exhibits no visual evidence of tread, sidewall, ply, cord, innerliner, or bead separation, chunking, broken cords, cracking or open splices as defined in § 571.109 of this chapter, and the tire pressure is not less than the pressure specified in paragraph (g)(1) of this section.

(A) The tire shall be graded C if it fails to complete the 500 rpm test stage specified in paragraph (g)(9) of this section.

(B) The tire may be graded B only if it successfully completes the 500 rpm test stage specified in paragraph (g)(9) of this section.

(C) The tire may be graded A only if it successfully completes the 575 rpm test stage specified in paragraph (g)(9) of this section.

(e) *Treadwear grading conditions and procedures*—(1) *Conditions.* (i) Tire treadwear performance is evaluated on a specific roadway course approximately 400 miles in length, which is established by the NHTSA both for its own compliance testing and for that of regulated persons. The course is designed to produce treadwear rates that are generally representative of those encountered by tires in public use. The course and driving procedures are described in appendix A of this section.

(ii) Treadwear grades are evaluated by first measuring the performance of a candidate tire on the government test course, and then correcting the projected mileages obtained to account for environmental variations on the basis of the performance of the course monitoring tires run in the same convoy.

(iii) In convoy tests, each vehicle in the same convoy, except for the lead vehicle, is throughout the test within human eye range of the vehicle immediately ahead of it.

(iv) A test convoy consists of two or four passenger cars, light trucks, or MPVs, each with a GVWR of 10,000 pounds or less.

(v) On each convoy vehicle, all tires are mounted on identical rims of design or measuring rim width specified for tires of that size in accordance with

49 CFR 571.109, S4.4.1 (a) or (b), or a rim having a width within −0 to + 0.50 inches of the width listed.

(2) *Treadwear grading procedure.* (i) Equip a convoy as follows: Place four course monitoring tires on one vehicle. Place four candidate tires with identical size designations on each other vehicle in the convoy. On each axle, place tires that are identical with respect to manufacturer and line.

(ii) Inflate each candidate and each course monitoring tire to the applicable pressure specified in Table 1 of this section.

(iii) Load each vehicle so that the load on each course monitoring and candidate tire is 85 percent of the test load specified in §575.104(h).

(iv) Adjust wheel alignment to the midpoint of the vehicle manufacturer's specifications, unless adjustment to the midpoint is not recommended by the manufacturer; in that case, adjust the alignment to the manufacturer's recommended setting. In all cases, the setting is within the tolerance specified by the manufacturer of the alignment machine.

(v) Subject candidate and course monitoring tires to ''break-in'' by running the tires in the convoy for two circuits of the test roadway (800 miles). At the end of the first circuit, rotate each vehicle's tires by moving each front tire to the same side of the rear axle and each rear tire to the opposite side of the front axle. Visually inspect each tire for any indication of abnormal wear, tread separation, bulging of the sidewall, or any sign of tire failure. Void the grading results from any tire with any of these anomalies, and replace the tire.

(vi) After break-in, allow the air pressure in the tires to fall to the applicable pressure specified in Table 1 of this section or for 2 hours, whichever occurs first. Measure, to the nearest 0.001 inch, the tread depth of each candidate and each course monitoring tire, avoiding treadwear indicators, at six equally spaced points in each groove. For each tire compute the average of the measurements. Do not measure those shoulder grooves which are not provided with treadwear indicators.

(vii) Adjust wheel alignment to the midpoint of the manufacturer's specifications, unless adjustment to the midpoint is not recommended by the manufacturer; in that case, adjust the alignment according to the manufacturer's recommended setting. In all cases, the setting is within the tolerance specified by the manufacturer of the alignment machine.

(viii) Drive the convoy on the test roadway for 16 circuits (approximately 6,400 miles).

(A) After every circuit (approximately 400 miles), rotate each vehicle's tires by moving each front tire to the same side of the rear axle and each rear tire to the opposite side of the front axle. Visually inspect each tire for treadwear anomalies.

(B) After every second circuit (approximately 800 miles), rotate the vehicles in the convoy by moving the last vehicle to the lead position. Do not rotate driver positions within the convoy. In four-car convoys, vehicle one shall become vehicle two, vehicle two shall become vehicle three, vehicle three shall become vehicle four, and vehicle four shall become vehicle one.

(C) After every second circuit (approximately 800 miles), if necessary, adjust wheel alignment to the midpoint of the vehicle manufacturer's specification, unless adjustment to the midpoint is not recommended by the manufacturer; in that case, adjust the alignment to the manufacturer's recommended setting. In all cases, the setting is within the tolerance specified by the manufacturer of the alignment machine.

(D) After every second circuit (approximately 800 miles), if determining the projected mileage by the 9-point method set forth in paragraph (e)(2)(ix)(A)(*1*) of this section, measure the average tread depth of each tire following the procedure set forth in paragraph (e)(2)(vi) of this section.

(E) After every fourth circuit (approximately 1,600 miles), move the complete set of four tires to the following vehicle. Move the tires on the last vehicle to the lead vehicle. In moving the tires, rotate them as set forth in paragraph (e)(2)(viii)(A) of this section.

(F) At the end of the test, measure the tread depth of each tire pursuant

to the procedure set forth in paragraph (e)(2)(vi) of this section.

(ix)(A) Determine the projected mileage for each candidate tire either by the nine-point method of least squares set forth in paragraph (e)(2)(ix)(A)(*1*) of this section and appendix C to this section, or by the two-point arithmetical method set forth in paragraph (e)(2)(ix)(A)(*2*) of this section. Notify NHTSA about which of the alternative grading methods is being used.

(*1*) *Nine-Point Method of Least Squares.* For each course monitoring and candidate tire in the convoy, using the average tread depth measurements obtained in accordance with paragraphs (e)(2)(vi) and (e)(2)(viii)(D) of this section and the corresponding mileages as data points, apply the method of least squares as described in appendix C to this section to determine the estimated regression line of y on x given by the following formula:

$$y = a + \frac{bx}{1000}$$

Where:

y = average tread depth in mils
x = miles after break-in,
a = y intercept of regression line (reference tread depth) in mils, calculated using the method of least squares; and
b = the slope of the regression line in mils of tread depth per 1,000 miles, calculated using the method of least squares. This slope will be negative in value. The tire's wear rate is defined as the absolute value of the slope of the regression line.

(*2*) *Two-point arithmetical method.* (*i*) For each course monitoring and candidate tire in the convoy, using the average tread depth measurements obtained in accordance with paragraphs (e)(2)(vi) and (e)(2)(viii)(F) of this section and the corresponding mileages as data points, determine the slope (m) of the tire's wear in mils of tread depth per 1,000 miles by the following formula:

$$m = 1000\,\frac{(Y1 - Yo)}{(X1 - Xo)}$$

Where:

Yo = average tread depth after break-in, mils.
Y1 = average tread depth after 16 circuits (approximately 6,400 miles), mils.
Xo = 0 miles (after break-in).
X1 = Total mileage of travel after 16 circuits (approximately 6,400 miles).

(*ii*) This slope (m) will be negative in value. The tire's wear rate is defined as the slope (m) expressed in mils per 1,000 miles.

(B) Average the wear rates of the four course monitoring tires as determined in accordance with paragraph (e)(2)(ix)(A) of this section.

(C) Determine the course severity adjustment factor by dividing the base course wear rate for the course monitoring tires (*see Note* to this paragraph) by the average wear rate for the four course monitoring tires.

NOTE TO PARAGRAPH (e)(2)(ix)(C): The ASTM F2493 standard reference test tire is the course monitoring tire (CMT). The base wear rate for the CMTs will be obtained by the Government by running the course monitoring tires for 16 circuits over the San Angelo, Texas, UTQGS test route 4 times per year, then using the average wear rate from the last 4 quarterly CMT tests for the base course wear rate calculation. Each new base course wear rate will be published in Docket No. NHTSA–2001–9395. The course monitoring tires used in a test convoy must be no more than one-year-old at the commencement of the test and must be used within four months after removal from storage.

(D) Determine the adjusted wear rate for each candidate tire by multiplying its wear rate determined in accordance with paragraph (e)(2)(ix)(A) of this section by the course severity adjustment factor determined in accordance with paragraph (e)(2)(ix)(C) of this section.

(E) Determine the projected mileage for each candidate tire by applying the appropriate formula set forth below:

(*1*) If the projected mileage is calculated pursuant to paragraph (e)(2)(ix)(A)(*1*) of this section, then:

$$\text{Projected mileage} = \frac{1000(a-62)}{b^1} + 800$$

Where:

a = y intercept of regression line (reference tread depth) for the candidate tire as determined in accordance with paragraph (e)(2)(ix)(A)(*1*) of this section.

b^1 = the adjusted wear rate for the candidate tire as determined in accordance with paragraph (e)(2)(ix)(D) of this section.

(*2*) If the projected mileage is calculated pursuant to (e)(2)(ix)(a)(*2*) of this section, then:

$$\text{Projected mileage} = \frac{-1000(Yo-62)}{mc} + 800$$

Where:

Yo = average tread depth after break-in, mils

mc = the adjusted wear rate for the candidate tires as determined in accordance with paragraph (e)(2)(ix)(D) of this section.

(F) Compute the grade (P) of the of the NHTSA nominal treadwear value for each candidate tire by using the following formula:

$$P = \frac{Projected\ mileage \times base\ course\ wear\ rate_n}{304}$$

Where base course wear $rate_n$ = new base course wear rate, *i.e.*, average treadwear of the last 4 quarterly course monitoring tire tests conducted by NHTSA.

Round off the percentage to the nearest lower 20-point increment.

(f) *Traction grading conditions and procedures*—(1) *Conditions.* (i) Tire traction performance is evaluated on skid pads that are established, and whose severity is monitored, by the NHTSA both for its compliance testing and for that of regulated persons. The test pavements are asphalt and concrete surfaces constructed in accordance with the specifications for pads ''C'' and ''A'' in the ''Manual for the Construction and Maintenance of Skid Surfaces,'' National Technical Information Service No. DOT-HS-800-814. The surfaces have locked wheel traction coefficients when evaluated in accordance with paragraphs (f)(2)(i) through (f)(2)(vii) of this section of 0.50 ±0.10 for the asphalt and 0.35 ±0.10 for the concrete. The location of the skid pads is described in appendix B to this section.

(ii) The standard tire is the tire specified in ASTM E 501 (incorporated by reference, *see* §575.3).

(iii) The pavement surface is wetted in accordance with paragraph 4.7, ''Pavement Wetting System,'' of ASTM E 274 (incorporated by reference, *see* §575.3).

(iv) The test apparatus is a test trailer built in conformity with the specifications in paragraph 4, ''Apparatus,'' of ASTM E 274 (incorporated by reference, *see* §575.3). The test apparatus is instrumented in accordance with paragraph 4.5 of that method, except that the ''wheel load'' in paragraph 4.3 and tire and rim specifications in paragraph 4.4 of that method are as specified in the procedures in paragraph (f)(2) of this section for standard and candidate tires.

(v) The test apparatus is calibrated in accordance with ASTM F 377 (incorporated by reference, *see* §575.3), with the trailer's tires inflated to 24 psi and loaded to 1,085 pounds.

(vi) Consecutive tests on the same surface are conducted not less than 30 seconds apart.

(vii) A standard tire is discarded in accordance with ASTM E 501 (incorporated by reference, *see* §575.3).

(2) *Procedure.* (i) Prepare two standard tires as follows:

(A) Condition the tires by running them for 200 miles on a pavement surface.

(B) Mount each tire on a rim of design or measuring rim width specified for tires of its size in accordance with 49 CFR 571.109, S4.4.1 (a) or (b), or a rim having a width within −0 to + 0.50 inches of the width listed. Then inflate the tire to 24 psi, or, in the case of a tire with inflation pressure measured in kilopascals, to 180 kPa.

(C) Statically balance each tire-rim combination.

(D) Allow each tire to cool to ambient temperature and readjust its inflation pressure to 24 psi, or, in the case of a tire with inflation pressure measured in kilopascals, to 180 kPa.

(ii) Mount the tires on the test apparatus described in paragraph (f)(1)(iv) of this section and load each tire to 1,085 pounds.

(iii) Tow the trailer on the asphalt test surface specified in paragraph (f)(1)(i) of this section at a speed of 40 mph, lock one trailer wheel, and record the locked-wheel traction coefficient on the tire associated with that wheel between 0.5 and 1.5 seconds after lockup.

(iv) Repeat the test on the concrete surface, locking the same wheel.

(v) Repeat the tests specified in paragraphs (f)(2) (iii) and (iv) of this section for a total of 10 measurements on each test surface.

(vi) Repeat the procedures specified in paragraphs (f)(2) (iii) through (v) of this section, locking the wheel associated with the other tire.

(vii) Average the 20 measurements taken on the asphalt surface to find the standard tire traction coefficient for the asphalt surface. Average the 20 measurements taken on the concrete surface to find the standard tire traction coefficient for the concrete surface. The standard tire traction coefficient so determined may be used in the computation of adjusted traction coefficients for more than one candidate tire.

(viii) Prepare two candidate tires of the same construction type, manufacturer, line, and size designation in accordance with paragraph (f)(2)(i) of this section, mount them on the test apparatus, and test one of them according to the procedures of paragraph (f)(2)(ii) through (v) of this section, except load each tire to 85% of the test load specified in §575.104(h). For CT tires, the test inflation of candidate tires shall be 230 kPa. Candidate tire measurements may be taken either before or after the standard tire measurements used to compute the standard tire traction coefficient. Take all standard tire and candidate tire measurements used in computation of a candidate tire's adjusted traction coefficient within a single three hour period. Average the 10 measurements taken on the asphalt surface to find the candidate tire traction coefficient for the asphalt surface. Average the 10 measurements taken on the concrete surface to find the candidate tire traction coefficient for the concrete surface.

(ix) Compute a candidate tire's adjusted traction coefficient for asphalt (μ_a) by the following formula:

(μ_a) = Measured candidate tire coefficient for asphalt + 0.50 − Measured standard tire coefficient for asphalt

(x) Compute a candidate tire's adjusted traction coefficient for concrete (μ_c) by the following formula:

μ_c = Measured candidate tire coefficient for concrete + 0.35μ Measured standard tire coefficient for concrete

(g) *Temperature resistance grading.* (1) Mount the tire on a rim of design or measuring rim width specified for tires of its size in accordance with §571.109, paragraph S4.4.1 (a) or (b) and inflate it to the applicable pressure specified in Table 1 of this section.

(2) Condition the tire-rim assembly to a temperature of 95 °F for at least 3 hours.

(3) Adjust the pressure again to the applicable pressure specified in Table 1 of this section.

(4) Mount the tire-rim assembly on an axle, and press the tire tread against the surface of a flat-faced steel test wheel that is 67.23 inches in diameter and at least as wide as the section width of the tire.

(5) During the test, including the pressure measurements specified in paragraphs (g) (1) and (3) of this section, maintain the temperature of the ambient air, as measured 12 inches from the edge of the rim flange at any point on the circumference on either side of the tire at 95 °F. Locate the temperature sensor so that its readings are not affected by heat radiation, drafts, variations in the temperature of the surrounding air, or guards or other devices.

(6) Press the tire against the test wheel with a load of 88 percent of the tire's maximum load rating as marked on the tire sidewall.

(7) Rotate the test wheel at 250 rpm for 2 hours.

(8) Remove the load, allow the tire to cool to 95 °F or for 2 hours, whichever occurs last, and readjust the inflation pressure to the applicable pressure specified in Table 1 of this section.

(9) Reapply the load and without interruption or readjustment of inflation pressure, rotate the test wheel at 375 rpm for 30 minutes, and then at successively higher rates in 25 rpm increments, each for 30 minutes, until the tire has run at 575 rpm for 30 minutes, or to failure, whichever occurs first.

TABLE I—TEST INFLATION PRESSURES

[Maximum permissible inflation pressure for the following test]

Test type	Tires other than CT tires									CT tires			
	psi				kPa					kPa			
	32	36	40	60	240	280	300	340	350	290	330	350	390
Treadwear test	24	28	32	52	180	220	180	220	180	230	270	230	270
Temperature resistant test	30	34	38	58	220	260	220	260	220	270	310	270	310

(h) *Determination of test load.* (1) To determine test loads for purposes of paragraphs (e)(2)(iii) and (f)(2)(viii), follow the procedure set forth in paragraphs (h) (2) through (5) of this section.

(2) Determine the tire's maximum inflation pressure and maximum load rating both as specified on the tire's sidewall.

(3) Determine the appropriate multiplier corresponding to the tire's maximum inflation pressure, as set forth in Table 2.

(4) Multiply the tire's maximum load rating by the multiplier determined in paragraph (h)(3). This is the tire's calculated load.

(5) Round the product determined in paragraph (h)(4) (the calculated load) to the nearest multiple of ten pounds or, if metric units are used, 5 kilograms. For example, 903 pounds would be rounded to 900 and 533 kilograms would be rounded to 535. This figure is the test load.

TABLE 2

Maximum inflation pressure	Multiplier to be used for treadwear testing	Multiplier to be used for traction testing
Tires other than CT tires		
32 psi	.851	.851
36 psi	.870	.797
40 psi	.883	.753
240 kPa	.866	.866
280 kPa	.887	.804
300 kPa	.866	.866
340 kPa	.887	.804
350 kPa	.866	.866
CT tires		
290 kPa	.866	.866
330 kPa	.887	.804
305 kPa	.866	.866
390 kPa	.887	.804

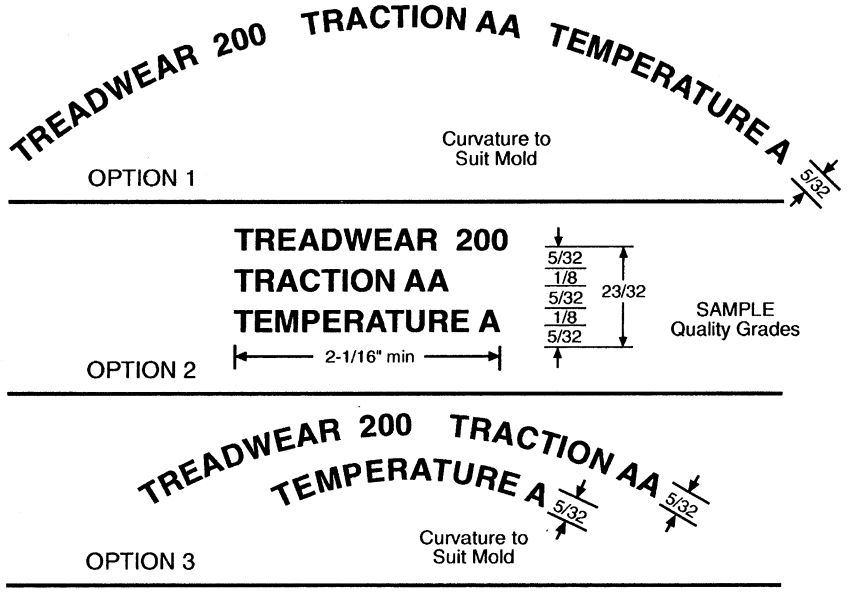
TABLE 2A

Tire size designation	Temp resistance			Traction	Treadwear		
	Max pressure				Max pressure		
	32	36	40		32	36	40
145/70 R13	615	650	685	523	523	553	582
155/70 R13	705	740	780	599	599	629	663
165/70 R13	795	835	880	676	676	710	748
175/70 R13	890	935	980	757	757	795	833
185/70 R13	990	1040	1090	842	842	884	926
195/70 R13	1100	1155	1210	935	935	982	1029
155/70 R14	740	780	815	629	629	663	693
175/70 R14	925	975	1025	786	786	829	871
185/70 R14	1045	1100	1155	888	888	935	982

TABLE 2A—Continued

Tire size designation	Temp resistance			Traction	Treadwear		
	Max pressure				Max pressure		
	32	36	40		32	36	40
195/70 R14	1155	1220	1280	982	982	1037	1088
155/70 R15	770	810	850	655	655	689	723
175/70 R15	990	1040	1090	842	842	884	927
185/70 R15	1100	1155	1210	935	935	982	1029
5.60–13	725	810	880	616	616	689	748
5.20–14	695	785	855	591	591	667	727
165–15	915	1,015	1,105	779	779	863	939
185/60 R 13	845	915	980	719	719	778	833

(i)–(l) [Reserved]



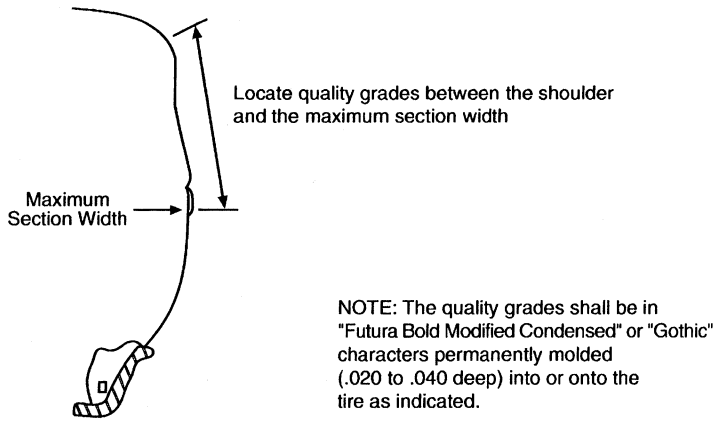


Figure 1

FIGURE 2—[PART I]—DOT QUALITY GRADES

TREADWEAR

TRACTION AA A B C

TEMPERATURE A B C

(Part II) All Passenger Car Tires Must Conform to Federal Safety Requirements in Addition to These Grades

TREADWEAR

The treadwear grade is a comparative rating based on the wear rate of the tire when tested under controlled conditions on a specified government test course. For example, a tire graded 150 would wear one and one-half (1½) times as well on the government course as a tire graded 100. The relative performance of tires depends upon the actual conditions of their use, however, and may depart significantly from the norm due to variations in driving habits, service practices and differences in road characteristics and climate.

TRACTION

The traction grades, from highest to lowest, are AA, A, B, and C. Those grades represent the tire's ability to stop on wet pavement as measured under controlled conditions on specified government test surfaces of asphalt and concrete. A tire marked C may have poor traction performance. Warning: The traction grade assigned to this tire is based on straight-ahead braking traction tests, and does not include acceleration, cornering, hydroplaning, or peak traction characteristics.

TEMPERATURE

The temperature grades are A (the highest), B, and C, representing the tire's resistance to the generation of heat and its ability to dissipate heat when tested under controlled conditions on a specified indoor laboratory test wheel. Sustained high temperature can cause the material of the tire to degenerate and reduce tire life, and excessive temperature can lead to sudden tire failure. The grade C corresponds to a level of performance which all passenger car tires must meet under the Federal Motor Safety Standard No. 109. Grades B and A represent higher levels of performance on the laboratory test wheel than the minimum required by law. Warning: The temperature grade for this tire is established for a tire that is properly inflated and not overloaded. Excessive speed, underinflation, or excessive loading, either separately or in combination, can cause heat buildup and possible tire failure.

APPENDIX A—TREADWEAR TEST COURSE AND DRIVING PROCEDURES

Introduction. The test course consists of three loops of a total of 400 miles in the geographical vicinity of Goodfellow AFB, San Angelo, Tex.

The first loop runs south 143 miles through the cities of Eldorado, Sonora, and Juno, Tex. to the Camp Hudson Historical Marker, and returns by the same route.

The second loop runs east over Farm and Ranch Roads (FM) and returns to its starting point.

The third loop runs northwest to Water Valley, northeast toward Robert Lee and returns via Texas 208 to the vicinity of Goodfellow AFB.

Route. The route is shown in Figure 3. The table identifies key points by number. These numbers are encircled in Figure 3 and in parentheses in the descriptive material that follows.

Southern Loop. The course begins at the intersection (1) of Ft. McKavitt Road and Paint Rock Road (FM388) at the northwest corner of Goodfellow AFB. Drive east via FM 388 to junction with Loop Road 306 (2). Turn right onto Loop Road 306 and proceed south to junction with US277 (3). Turn onto US277 and proceed south through Eldorado and Sonora (4), continuing on US277 to junction with FM189 (5). Turn right onto FM189 and proceed to junction with Texas 163 (6). Turn left onto Texas 163, and at the option of the manufacturer:

(A) Proceed south to Camp Hudson Historical Marker and onto the paved shoulder (7). Reverse route to junction of Loop Road 306 and FM 388 (2); or

(B) Proceed south to junction with Frank's Crossing. Reverse route at Frank's Crossing and proceed north on Texas 163 to junction with Highway 189; Reverse route at junction with Highway 189; proceed south on Texas 163 to junction with Frank's Crossing; reverse route at Frank's Crossing and proceed north to junction of Loop Road 306 and FM 388 (2).

Eastern Loop. From junction of Loop Road 306 and FM388 (2), make right turn onto FM388 and drive east to junction with FM2334 (13). Turn right onto FM2334 and proceed south across FM765 (14) to junction of FM2334 and US87 (15). For convoys that originate at Goodfellow AFB, make U-turn and return to junction of FM388 and Loop Road 306 (2) by the same route. For convoys that do not originate at Goodfellow AFB, upon reaching junction of FM2334 and US87 (15), make U-Turn and continue north on FM2334 past the intersection with FM388 to Veribest Cotton Gin, a distance of 1.8 miles beyond the intersection. Make U-turn and return to junction of FM2334 and FM388. Turn right onto FM388, proceed west to junction FM388 and Loop Road 306.

Northwestern Loop. From junction of Loop Road 306 and FM388 (2), make right turn onto Loop Road 306. Proceed onto US277, to junction with FM2105 (8). Turn left onto FM2105 and proceed west to junction with US87 (10). Turn right on US87 and proceed northwest to the junction with FM2034 near the town of Water Valley (11). Turn right onto FM2034 and proceed north to Texas 208 (12). Turn right onto Texas 208 and proceed south to junction with FM2105 (9). Turn left onto FM2105 and proceed east to junction with

US277 (8). Turn right onto US277 and proceed south onto Loop Road 306 to junction with FM388 (2). For convoys that originate at Goodfellow AFB, turn right onto FM388 and proceed to starting point at junction of Ft. McKavitt Road and FM388 (1). For convoys that do not originate at Goodfellow AFB, do not turn right onto FM388 but continue south on Loop Road 306.

Alternate Route When FM 189 and Texas 163 are Closed. This alternate test course route consists of a *Modified Southern Loop*, the *Eastern Loop* and *Northwestern Loop* described above, and a *Modified Northwestern Loop*.

Modified Southern Loop. The course begins at the intersection (1) of Ft. McKavitt Road and Paint Rock Road (FM 388) at the northwest corner of Goodfellow AFB. Drive east via FM 388 to junction with Loop Road 306 (2). Turn right onto Loop Road 306 and proceed south to junction with US 277 (3). Turn onto US 277 and proceed south through Eldorado and Sonora (4), continuing on US 277 approximately 5.5 miles (from traffic light at separation of US 277 and Loop 467) to picnic area on right. Reverse route at this location and proceed north to junction of Loop 306 and FM 388 (2).

Eastern Loop and Northwestern Loop. From junction of Loop Road 306 and FM 388 (2), complete the *Eastern Loop*, the *Northwestern Loop*, and then, from junction of Loop Road 306 and FM 388 (2), repeat the *Eastern Loop*.

Modified Northwestern Loop. Proceed north on Northwestern Loop as normal until reaching the intersection of FM 2105 and Texas 208 and turn right onto Texas 208. Proceed on Texas 208 until the intersection with FM 2034. Turn left onto FM 2034 and continue on FM 2034 to the intersection with US 87. Turn left onto US 87. At the intersection of US 87 and FM 2105 turn left onto FM 2105 and proceed to the intersection with US 277. Turn right onto US 277 and proceed to the intersection of Loop Road 306 and FM 388 (2).

Repeat Eastern Loop. Turn left onto FM 388 and repeat the *Eastern Loop*. For convoys that originate at Goodfellow AFB, continue on FM 388 and proceed to starting point at junction of Ft. McKavitt Road and FM 388 (1). For convoys that do not originate at Goodfellow AFB, turn left onto Loop Road 306.

Driving instructions. The drivers shall run at posted speed limits throughout the course unless an unsafe condition arises. If such condition arises, the speed should be reduced to the maximum safe operating speed.

Braking Procedures at STOP signs. There are a number of intersections at which stops are required. At each of these intersections a series of signs is placed in a fixed order at follows:

SIGN LEGEND

Highway Intersection 1000 (or 2000) Feet
STOP AHEAD
Junction XXX
Direction Sign (Mereta→)
STOP or YIELD

Procedures. 1. Approach each intersection at posted speed limit.

2. When abreast of the STOP AHEAD sign, apply the brakes so that the vehicle decelerates smoothly to 20 mph when abreast of the direction sign.

3. Come to a complete stop at the STOP sign or behind any vehicle already stopped.

KEY POINTS ALONG TREADWEAR TEST COURSE, APPROX. MILEAGES, AND REMARKS

		Mileages	*Remarks*
1	Ft. McKavitt Road & FM 388	0	
2	FM388 & Loop 306 *	2	STOP
3	Loop 306 & US277 ..	10	
4	Sonora	72	
5	US 277 & FM 189 ...	88	
6	FM 189 & Texas 163 .	124	
7	Historical Marker ... (Camp Hudson)	143	U-TURN
4	Sonora	214	
3	Loop 306 & US 277 ..	276	
2	FM 388 & Loop 306 .	283	
13	FM 388 & FM 2334 †	290	STOP
14	FM 2334 & FM 765 ..	292	STOP
15	FM 2334 & US 87 ...	295	U-TURN
14	FM 2334 & FM 765 ..	298	STOP
13	FM 388 & FM 2334 ..	300	STOP/YIELD/ BLINKING RED LIGHT
2	FM 388 & Loop 306	307	STOP/YIELD/ BLINKING RED LIGHT
8	US 277 & FM 2105 ..	313	
9	FM 2105 & Texas 208	317	STOP
10	FM 2105 & US 87 ...	320	STOP
11	FM 2034 & US 87 ...	338	
12	FM 2034 & Texas 208	362	YIELD
9	FM 2105 & Texas 208	387	
8	FM 2105 & US 277 ..	391	YIELD/STOP
2	FM 388 & Loop 306 *	398	
1	Ft. McKavitt Road & FM 388	400	
16	Veribest Cotton Gin .	1.8	U-TURN

* Convoys not originating at Goodfellow AFB will not traverse the leg of course.

† Convoys not originating at Goodfellow AFB will proceed to 16, Veribest Cotton Gin, Make U-Turn and return to 13.

FIGURE 2

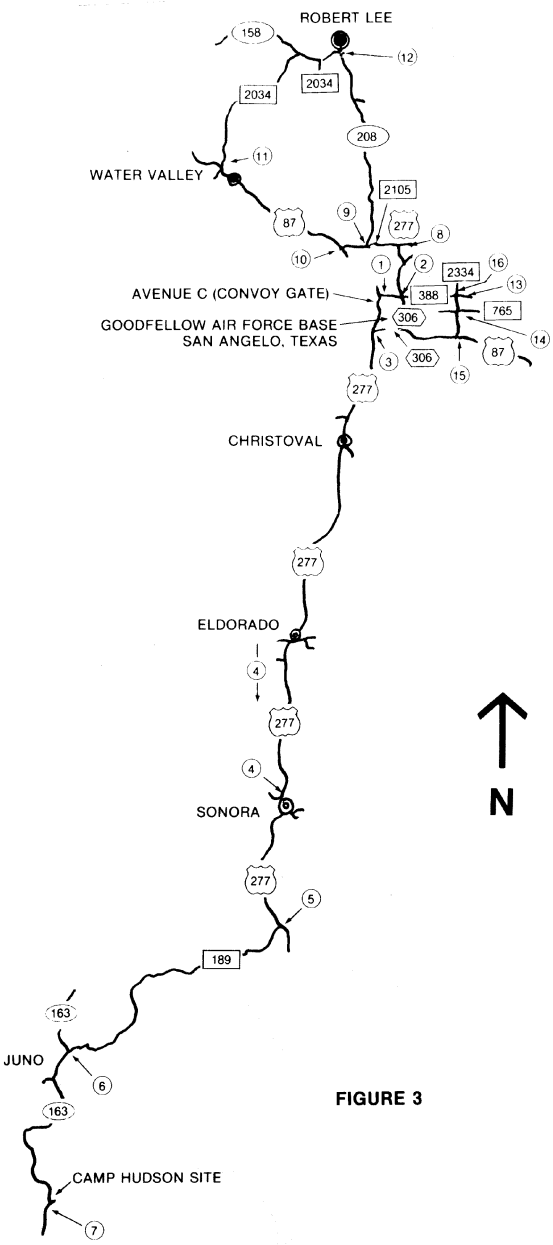


FIGURE 3

APPENDIX B—TRACTION SKID PADS

Two skid pads have been laid on an unused runway and taxi strip on Goodfellow AFB. Their location is shown in Figure 4.

The asphalt skid pad is 600 ft. × 60 ft. and is shown in black on the runway in Figure 4. The pad is approached from either end by a

75 ft. ramp followed by 100 ft. of level pavement. This arrangement permits the skid trailers to stabilize before reaching the test area. The approaches are shown on the figure by the hash-marked area.

The concrete pad is 600 ft. × 48 ft. and is on the taxi strip. The approaches to the concrete pad are of the same design as those for the asphalt pads.

A two lane asphalt road has been built to connect the runway and taxi strip. The road is parallel to the northeast-southwest runway at a distance of 100 ft. The curves have super-elevation to permit safe exit from the runway at operating speeds.

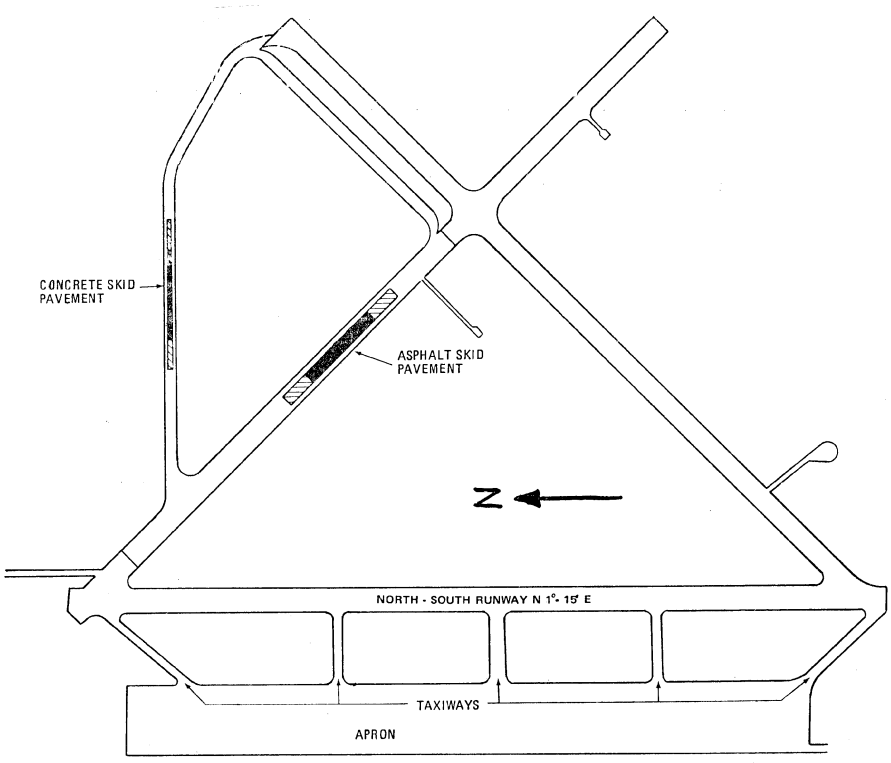


FIGURE 4

APPENDIX C—METHOD OF LEAST SQUARES

The method of least squares is a method of calculation by which it is possible to obtain a reliable estimate of a true physical relationship from a set of data which involve random error. The method may be used to establish a regression line that minimizes the sum of the squares of the deviations of the measured data points from the line. The regression line is consequently described as the line of ''best fit'' to the data points. It is described in terms of its slope and its ''y'' intercept.

The graph in Figure 5 depicts a regression line calculated using the least squares method from data collected from a hypothetical treadwear test of 6,400 miles, with tread depth measurements made at every 500 miles.

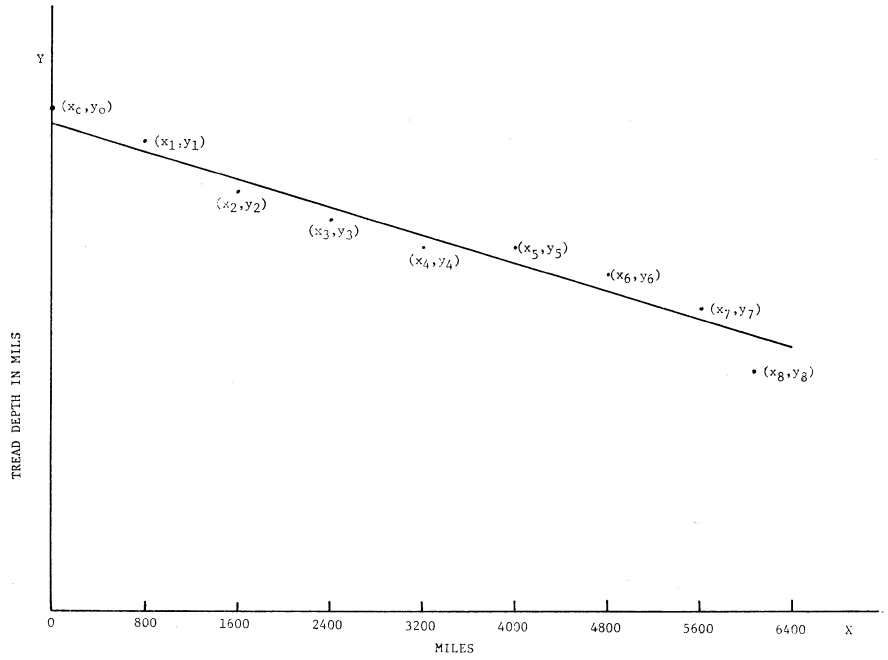


FIGURE 5

In this graph, $x_j, y_{j\ (j\ =\ 0,\ 1,\ \ldots\ \geq.\ 8)}$ are the individual data points representing the tread depth measurements (the overall average for the tire with 6 measurements in each tire groove) at the beginning of the test (after break-in) and at the end of each 800-mile segment of the test.

The absolute value of the slope of the regression line is an expression of the mils of tread worn per 1,000 miles, and is calculated by the following formula:

$$b = 1000\,\frac{\left(\sum_{j=0}^{8} X_j Y_j - \frac{1}{9}\sum_{j=0}^{8} X_j \sum_{j=0}^{8} Y_j\right)}{\sum_{j=0}^{8} X_j^{\,2} - \frac{1}{9}\left(\sum_{j=0}^{8} X_j\right)^2}$$

The ''y'' intercept of the regression line (a) in mils is calculated by the following formula:

$$a = \frac{1}{9}\sum_{j=0}^{8} Y_j - \frac{b}{9000}\sum_{j=0}^{8} X_j$$

APPENDIX D—USER FEES

1. *Use of Government Traction Skid Pads:* A fee of $125 will be assessed for each hour, or fraction thereof, that the traction skid pads at Goodfellow Air Force Base, San Angelo, Texas are used. This fee is based upon the market price of the use of the traction skid pads.

2. Fee payments shall be by check, draft, money order, or Electronic Funds Transfer System made payable to the Treasurer of the United States.

3. The fee set forth in this Appendix continues in effect until adjusted by the Administrator of NHTSA. The Administrator reviews the fee set forth in this Appendix and, if appropriate, adjusts it by rule at least every 2 years.

[43 FR 30549, July 17, 1978]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §575.104, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov*.